

AMENDED CLAIMS (Article 34)

1. (cancelled)
2. (cancelled)
3. (cancelled)
4. (cancelled)
5. (cancelled)
6. (cancelled)
7. (cancelled)
8. (cancelled)

9. (added)

A manufacturing method for microcapsules comprising the steps of:
allowing a continuous phase material to flow through a microchannel;
allowing a polyelectrolyte solution as a disperse phase to flow through another microchannel, the microchannels being joined with each other to allow the continuous phase and the disperse phase to join in a state of a laminar flow;

thereafter reducing the flow rate of the continuous phase and the disperse phase in a dramatic way so as to prepare an emulsion which contains the polyelectrolyte solution as a disperse phase having a uniform diameter;

demulsifying the emulsion; and

contacting the polyelectrolyte solution as a disperse phase with a polyelectrolyte solution having a reverse electric charge to the polyelectrolyte solution as a disperse phase or a polyvalent ion solution at the same time of the demulsifying step so as to form a gel layer made of a polyelectrolyte complex around fine particles of the polyelectrolyte solution as a disperse phase by a polyelectrolyte reaction.

10. (added)

The manufacturing method for microcapsules according to claim 9, wherein the microchannels are formed on a glass base or a silicon base.

11. (added)

The manufacturing method for microcapsules according to claim 9, wherein the flow rate is reduced in a dramatic way by using a pool having a large volume of capacity.

12. (added)

A manufacturing method for microcapsules, which is performed in a single apparatus comprising a case, a first passage for a disperse phase, a second passage for a continuous phase, a plate positioned between the first passage and the second passage, penetrating holes formed in the plate, and a division wall provided in a substantially central area of the first passage to divide the first passage into first and second sections, comprising the steps of:

supplying a continuous phase to the second passage;

supplying a polyelectrolyte solution as a disperse phase to the first section of the first passage in a state of applying greater pressure to the polyelectrolyte solution than to the continuous phase so as to push the disperse phase into the continuous phase via the penetrating holes to prepare an emulsion;

supplying a polyelectrolyte solution having a reverse electric charge to polyelectrolyte solution as a disperse phase or a polyvalent ion solution to the second section of the first passage in a state of applying greater pressure to the polyelectrolyte solution having a reverse electric charge or the polyvalent ion solution than to the continuous phase; and

contacting the polyelectrolyte solution as a disperse phase with the polyelectrolyte solution having a reverse electric charge or the polyvalent ion solution while the emulsion is demulsified so as to form a gel layer made of a polyelectrolyte complex around fine particles of the polyelectrolyte solution as a disperse phase by a polyelectrolyte reaction.

13. (added)

The manufacturing method for microcapsules according to any one of claims 9-12, wherein the emulsion is demulsified by adding the same material as the continuous phase or a soluble material to the continuous phase thereto so as to reduce the concentration of a surface-active agent.

14. (added)

The manufacturing method for microcapsules according to any one of claims 9-12, wherein a surface-active agent is originally not added to the continuous phase such that an emulsion which easily is demulsified is prepared, and this emulsion is contacted with the polyelectrolyte solution having a reverse electric charge or the polyvalent ion solution immediately.

15. (added)

The manufacturing method for microcapsules according to any one of claims 9-14, wherein the disperse phase is selected from a group of an alginic acid, carboxymethyl cellulose, pectin, carrageenan, sulfate cellulose, and chondroitin sulfuric acid; the polyelectrolyte to be reacted with the disperse phase is selected from a group of a polyamino acid, polymer containing a primary amine group, a secondary amine group, a tertiary amine group, or pyridinyl nitrogen, and aminated polysaccharide; and the polyvalent ion to be reacted with the disperse phase is selected from a group of Ca^{2+} , Ba^{2+} , Pb^{2+} , Cu^{2+} , Cd^{2+} , Sr^{2+} , Co^{2+} , Ni^{2+} , Zn^{2+} and Mn^{2+} .

16. (added)

The manufacturing method for microcapsules according to any one of claims 9-15, wherein a cell which generates a desired material is added to the polyelectrolyte solution as a disperse phase in advance.

17. (added)

The manufacturing method for microcapsules according to any one of claims 9-16, wherein the diameter of the disperse phase is within the range of 50 - 300 μm .

18. (added)

A method for treating a human body, wherein the microcapsule manufactured by the method according to any one of claims 9-17 is injected into parts of a human body by an injector, a catheter or an operation.